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January 22, 1993

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Ms. Donna R. Searcy
Secretary
Federal Communications Commission
1919 M Street, NW
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

RE: In the Matter of Redevelopment of Spectrum to Encourage
Innovation in the Use of New Telecommunications Technologies
ET Docket 92-9, RM-7981, RM-8004.

Dear Secretary Searcy:

Enclosed herewith is one (1) original, and 5 (five) copies of our
reply comments to the Further Notice of Proposed Rulemaking RM-
7981, RM-8004.

Sincerely,

COMSEARCH

Christopher R. Hardy
Manager
Transmission Planning Services

CRH:msw

Enclosure

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**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the matter of

Redevelopment of Spectrum to)	
Encourage Innovation in the)	ET Docket No. 92-9
Use of New Telecommunications)	RM-7981
Technologies)	RM-8004

To: The Commission

REPLY COMMENTS OF COMSEARCH

Comsearch, hereby respectfully replies to the comments submitted in response to the Further Notice of Proposed Rulemaking (FNPRM) in the above captioned proceeding.

It appears from the comments submitted that general agreement exists concerning the Commission's efforts to facilitate the transition of displaced 2 GHz users. Most commenters agreed that some allowance for narrowband channels was necessary in the bands above 3 GHz. However, certain considerations remain under contention. Namely, the amount of bandwidth necessary to accommodate the displaced users, the best location for these users to occupy, and the regulations and technical standards required to adequately administer the transition. Comsearch views the comments, as a collective whole, to be a positive step forward in setting the stage for improved spectrum efficiency and an orderly transition of displaced 2 GHz users. It is essential that the Commission, through subsequent actions, strives to maintain the integrity of systems for both new and incumbent users.

GOVERNMENT SPECTRUM

The option of using Government Spectrum in the 1.7 - 1.8 and 3.6 - 3.7 GHz bands appears to be the most appealing to all parties concerned and we agree that the Commission should continue it's discussions with the NTIA regarding use of those bands.

CHANNEL PLANS

Any new plan that incorporates narrowband channels into a wideband environment will tend to complicate the interference environment. However, any problems which are created can be overcome through the use of proper engineering practices and consideration of new interference objective requirements.

We agree in concept with the TIA and joint comments of Harris, DMC and Telesciences that some enforcement mechanism needs to be in place to protect against misuse of wideband channels. However, regulations that screen potential abuse by users applying for more spectrum than necessary should not be overly cumbersome to those users with legitimate spectrum requirements.

In all frequency bands, TIA differs on the frequency plan subdivisions below 5 MHz. TIA's plan is based on 1.25 MHz bandwidths, while the FNPRM and Alcatel's plan is based on 800 kHz bandwidths (The 400 kHz plan should be abolished as the current minimum bandwidth at 2.1 GHz is 800 kHz). Whichever plan is

selected, frequencies should still be allocated only in the guard bands of the lower 6 GHz band to adequately segregate these systems from higher capacity systems.

4 GHz

Comsearch concurs with the many commenters that the existing 4 GHz plan should be retained as opposed to the new high-low plan proposed in the FNPRM.¹ Several of these same commenters identified drawbacks with the proposed plan. Notably, increased terrestrial interference problems from the mixing of a new high-low plan with the existing interstitial plan, and increased conflicts with earth stations from the introduction of new narrow band terrestrial channels.

Upon review of the 4 GHz plan proposed by AT&T several problem areas were noted. First, the plan was derived under the assumption that the "TD" plan (transmitting the A and C groups and receiving the B and D groups in the terminology of the Comsearch comments) is the only existing 4 GHz plan. AT&T states that "the plan has been used for nearly all applications at 4 GHz." However, numerous 4 GHz paths (including many in the AT&T system) use the alternate plan, transmitting the A and D groups and receiving the B and C groups in the Comsearch terminology. Using the proposed AT&T plan

¹ See, comments of TIA, NSMA, HBO, Hughes Communications Galaxy, GTE Service Corp., Northern Telecom and the joint comments of Harris Corporation, Digital Microwave and Telesciences.

in areas where the AD/BC plan is predominant could result in reduced frequency availability because of insufficient T/R separation. Using AT&T's proposed primary 5 MHz bandwidth channels as an example, frequency pairs 3702.5/3762.5 and 3707.5/3767.5 could be used, but pairs 3722.5/3742.5 and 3727.5/3747.5 could not be used with only 20 MHz T/R separation. Second, the AT&T plan imposes a T/R separation of 40 MHz on the narrowband channels to match the existing 4 GHz plans. However, the equipment vendors may prefer to design equipment to use greater T/R separations. The plan included in the Comsearch comments (a modification of the plan in the original FNPRM) is compatible with both existing 4 GHz plans and allows T/R separations of much greater than 40 MHz. Finally, AT&T proposes preserving the 4180-4200 band for "4 GHz future technologies." In light of the Commission's action to clear spectrum at 2 GHz for emerging technologies, it appears unnecessary to preserve this additional spectrum at 4 GHz. Regardless of the channelization scheme ultimately chosen, Comsearch maintains that the 4 GHz band is a poor substitute for displaced 2 GHz users due to the prohibitive costs associated with engineering a microwave system around earth station locations.

LOWER 6 GHz (5925 - 6425 MHz) FREQUENCY PLAN

29.652 MHz or 30 MHz Plan?

Most of the commenters agreed with our proposal to maintain the existing "TH" frequency plan which utilizes 29.652 MHz frequency separation between adjacent channels and 252.04 MHz frequency

separation between high/low pairs.² It must be pointed out that while this plan only has 29.652 MHz between adjacent channels, all of the high capacity analog and digital equipment is type accepted to occupy 30 MHz of bandwidth. We agree with AT&T's proposal to subdivide the 29.652 MHz plan into 9.884 and 4.942 MHz plans, with the stipulation that the equipment used in these two plans be type accepted for 10 MHz and 5 MHz bandwidths. While we agree with Alcatel and TIA that it would be beneficial to standardize the plan into 30 MHz slots, thus making it easier to subdivide the plan into 10 and 5 MHz plans, a review of our database indicates that well over 52,000 frequencies are currently licensed under the old frequency plan. Overlaying the FNPRM proposed frequency plan on top of the existing plan adds another level of unnecessary complexity to the frequency coordination process and requires significant discussion of grandfathering of existing plans for growth on existing paths or new paths added to existing systems. Interference with analog systems becomes a significant problem with the FNPRM proposed plan due to carrier beat, which can be minimized by maintaining the "TH" plan. Contrary to popular belief, analog is not dead. Indeed, a review of our database indicates that over 15,000 analog message frequencies and over 4,000 analog video frequencies are still licensed in the lower 6 GHz band today. Additionally, it is unlikely that a displaced Private Microwave user would place digital paths in the middle of an all analog network.

²

See, comments of AT&T at Appendix B, page 2 which depict the prevailing "TH" frequency plan.

SUBDIVISION OF LOWER 6 GHz BAND TO ACCOMMODATE LOW CAPACITY SYSTEMS

It is imperative to follow the example set-forth in Alcatel's proposal and the FNPRM to segregate the different bandwidth plans into differing sections of the band as much as possible. As MCI mentioned on page 3 of it's comments it is inefficient use of the spectrum to overlay all of these bandwidths on top of one another, as one 400 kHz user could deny a high capacity user 30 MHz of spectrum. We propose even further segregation of differing bandwidths than that proposed in the FNPRM, or by TIA and AT&T. Our experience coordinating in the 17.7 - 19.7 GHz band where numerous bandwidths overlap each other, has shown that the narrow band channels preclude the use of the wider band high capacity channels in congested areas. In fact, TIA Bulletin TSB10-E contains a recommended band utilization plan for segregating differing channel bandwidths in the 18 GHz band.³ This plan was developed to avoid the problems encountered when plans with differing bandwidths overlap one another. However, in congested areas it is not possible to avoid the overlap and this results in inefficient use of the spectrum. Assigning different areas of the band for primary usage of differing bandwidths is certainly the most desirable solution.⁴

³ TIA TSB10-E Pages 59, 60, 63, and 72

⁴ AT&T methodology appears to agree with this approach.

We agree with EMI's comments that bandwidths below 5 MHz separation should be limited to the guard bands (5925.0 - 5930.372, 6167.588 - 6182.412, 6419.628 - 6425.0), and these portions of the spectrum should be allocated to narrow bandwidth users on a primary basis.

There are currently six pairs of 800 kHz frequencies and three pairs of 1.6 MHz frequencies allocated in the upper 6 GHz (6525 - 6875 MHz) band.⁵ A review of our database indicates that these frequencies are not used. Therefore, with the guard bands re-allocated in the lower 6 GHz band, the total available frequency pairs will be; 18 800 kHz and 10 1.6 MHz. This should be more than sufficient spectrum to accommodate narrow band users. With this amount of "virgin" spectrum available on a primary basis for narrow band use, we see no reason to re-allocate additional portions of the band for these systems. In fact, TIA and the FNPRM allocate well over 40 frequency pairs to 1.6 or 1.25 MHz systems in the lower 6 GHz band, and over 40 pairs in the upper 6 GHz band. We do not believe there will be sufficient demand for these narrow band systems to justify allocating this much spectrum. In the FNPRM, we propose to eliminate frequency pairs 6110.84 - 6360.84 through 6167.5 - 6417.5 from the 1.6 MHz allocation. In TIA's proposed plan all frequency pairs between 6110.625 - 6360.625 and 6166.875 - 6416.875 would be eliminated from the 1.25, 2.5 & 3.75 MHz plans.

⁵ 47 CFR 94.65(g)(1,2)

We disagree with AT&T's plan to set aside the guard bands as well as 118.6 MHz at the band edges (and middle) for Future Technologies, and believe that the loss of 220 MHz of bandwidth at 2 GHz makes it imperative for these portions of the band to continue to be allocated to point-to-point users. AT&T has presented no compelling argument that the recently allocated spectrum for Future Technologies at 2 GHz is insufficient and would require additional allocations at 6 GHz.

The 10 MHz bandwidth channels should be limited to the top 59.304 MHz of the low and high TH plan. The FNPRM proposes to allocate all of the band to 10 MHz bandwidth channels, leaving no 30 MHz channels for primary assignment to high capacity users.

Since the exact channel bandwidths of the narrow band channels have not been determined, a detailed frequency plan will not be presented herein. Exact frequencies can be specified once the channel bandwidth has been decided. However, Figure 1 depicts our recommended bandwidth allocation plan based on the 29.652 MHz TH plan. For ease of presentation the 29.652 MHz plan is presented as 30 MHz, the 9.884 MHz plan as 10 MHz, and the 4.942 MHz plan as 5 MHz. Note that we have limited the 5 and 10 MHz bandwidths to the top 59.304 MHz of spectrum in the TH plan. This allows six go/return frequencies with 10 MHz bandwidth and twelve go/return with 5 MHz bandwidth for primary allocation. An additional 30 MHz of spectrum is allocated on a secondary basis to these systems should the primary spectrum be unavailable.

6 GHz Allocation Priority

In order for users to know which portion (upper or lower) of the 6 GHz spectrum to use for a given application, rules governing allocation priorities need to be established. The lower 6 GHz band is currently a high capacity, wide bandwidth band (30 MHz BW), while the upper 6 GHz band is allocated to lower capacities and bandwidths 10 MHz and less. It therefore seems logical to segregate systems by capacity and bandwidth requirements as much as possible. For 6 GHz proposals, the primary allocation for systems 10 MHz bandwidth and less should be the upper 6 GHz band. The frequencies allocated in the lower 6 GHz band for 10 MHz and less should only be used if the upper 6 GHz frequencies are unavailable. One exception to this would be the narrow band channels allocated in the guard bands in the lower 6 GHz band. These narrow band channels along with the existing narrow band channels in the upper 6 GHz bands should be used before the other proposed narrow band allocations in the upper 6 GHz band.

10700 - 11700 CHANNELIZATION PLAN

We agree with AT&T's plan for sub-dividing the 11 GHz band except that frequencies 10715 MHz and 11685 MHz can not be allocated to the 40 MHz bandwidth plan as the occupied bandwidths would spill over the band edges. An alternate proposal would be to use TIA's proposed 40 MHz plan instead of AT&T's, but in conjunction with

AT&T's 10, 20 & 30 MHz plans. AT&T & TIA proposed narrow bandwidth plans below 10 MHz bandwidth. We do not feel that these narrow bandwidths are warranted due to the vast amount of spectrum to be allocated to narrow band systems in the 10.55 - 10.68 GHz band.

GRANDFATHERING

It is our belief that any narrowband channelization of the bands above 3 GHz can be accommodated within the framework of existing frequency plans. Therefore, grandfathering of existing plans becomes moot. If alternate frequency plans are adopted, expansion and continued development of existing plans should be allowed indefinitely. Comsearch agrees with the comments made by WTCI and NSMA that specific language defining grandfathering is required in the rules.⁶ The nature of this language should be based ultimately upon the frequency plans adopted.

The NSMA and Bell Atlantic Companies comment in favor of grandfathering DTS systems which would allow for the addition to and expansion of existing DTS operations. Comsearch maintains that it will be very difficult to implement point to point systems in a DTS environment. If additional nodal and end user locations are to be permitted under the definition of grandfathering, some form of coordination should be implemented. Otherwise point to point users will be precluded from using frequencies within a potentially wide area of operation in the proximity of a DTS system.

⁶ See, comments of NSMA, page 4 and WTCI, page 3.

Currently, a DTS licensee could have one point-to-point path and preclude all other users from using this frequency in a wide area.

COORDINATION PROCEDURES

Comsearch agrees with the general industry consensus that one set of coordination procedures should be established for all bands and that the procedures set forth in Part 21 of the rules would be the most applicable.⁷ History has shown this process to be highly effective in dealing with the complex issues involved in engineering microwave systems. The success of any band sharing arrangement will be facilitated by adoption of the prior coordination procedures outlined in 47 CFR 21.100 (d).

INTERFERENCE STANDARDS

In addition to establishing one set of coordination procedures for all bands, many commenters expressed a desire for one set of interference criteria. Contrary to the comments of several parties, the interference criteria set forth in TIA TSB10-E is not more stringent than the NSMA criteria used by Common Carriers. In fact, the analog interference criteria was developed using the same equations. The only difference between the two sets of criteria is the allowable baseband noise, which is more stringent for Common Carrier long-haul high capacity systems. For digital systems, the

⁷ See, joint comments of Harris Corporation, Digital Microwave and Telesciences page 14, comments of USTA, page 7, TIA, page 13, NSMA, page 6, and UTC, page 10.

NSMA criteria employs C/I (Carrier / Interference ratio) objectives while the TIA TSB10-E criteria is based on T/I (Threshold / Interference ratio). The TIA method is a much more accurate depiction of interference requirements for digital systems since it uses the actual path thermal fade margin. However, the drawbacks associated with this method are the tendency to over-engineer paths for unrealistic and indeed unattainable thermal fade margins, and the requirement that the digital equipment manufacturer provide detailed T/I information for every possible type of interferer (with overlapping bandwidths this requirement will require numerous different T/I profiles for each radio).

NSMA Working Group 5 and TIA committee TR14.11 have been working in concert to develop one set of interference criteria that will meet the requirements of both the Private Microwave and the Common Carrier licensee. We expect that the latest revision to TSB10-E (to be called TSB10-F) will be approved and published sometime this summer. This version of the bulletin incorporates many of the procedures and methods long used in the Common Carrier coordination community. The TIA TR14.11 and NSMA Working Group 5 joint committee will begin working on further revisions to standardize requirements and procedures once the re-channelization has been finalized.

GROWTH CHANNELS

The comments to the FNPRM revealed differing concepts of growth channel reservation which reflect the diversity of users needs within the industry. In most instances some form of growth channel reservation was seen as necessary, however the methods to regulate this process were varied.⁸ Comsearch maintains that flexibility in the regulatory environment is needed to protect the interests of legitimate users, while also protecting against unwarranted warehousing of spectrum. The informal recognition of growth channels currently found in the prior coordination process offers this flexibility. It seems reasonable to restrict growth on narrowband channels (10 mhz or less) since additional capacity could be found utilizing higher bandwidth channels. Wideband users on the other hand have no alternative for future growth but to protect channels of similar bandwidth.

A distinction needs to be made between proposed systems and licensed systems with coordinated proposed future growth. For new proposals (unconstructed paths), the current six month time limit between prior coordination and FCC filing is sufficient and we do

⁸ Pactel and AT&T stated 6 months was too short a time period for the reservation of growth, with AT&T stating a minimum of 5 years was necessary. EMI and WTCI favored maintaining the existing process found in Part 21 prior coordination. The TIA, Harris, Digital Microwave and Telesciences do not want the commission to formalize a system of growth reservation, but leave it on a first come, first served basis. The UTC wants to limit the renewal process to one six month period, prohibiting recoordination for 6 months if no application is filed.

not believe any changes are necessary. A prohibition on coordination or renewal of a proposal after a set period of time is not necessary as prior coordinated proposals have secondary or no standing at the FCC. If a new proposal is coordinated that conflicts with one that has been coordinated and renewed but not filed, the new proposal can be filed at the FCC. This forces the other party to either file a petition to deny or relinquish his claim to the frequencies. If a petition is filed, the Commission gets involved and "forces" a decision. The small number of petitions received by the Commission over the past twenty years proves that this process works.

Future growth on high capacity, wide band systems still needs to be prior coordinated and protected. The current FCC rules, prior coordination procedures, and NSMA guidelines limit "warehousing" of the frequency spectrum. As is the case with proposed paths, during the prior coordination process many techniques are employed to avoid blocking the growth of previously coordinated or licensed paths. However, in instances where there is no practical way to coordinate around a growth channel, most of the time it is possible to negotiate a successful resolution with the affected party. If a satisfactory solution can not be negotiated, the last resort is to let the Commission or an arbiter decide which party gets the frequency. These cases rarely get to this point, thus relieving the Commission of the added burden associated with getting involved in the frequency coordination process.

ANTENNA CRITERIA

Comsearch agrees with the comments of GTE Service Corp, AT&T, MCI and the USTA that antenna standards currently found in Parts 21.108 and 94.75 should be updated. This is especially applicable in the common carrier bands as a result of the proposed rechannelizations and introduction of new narrowband channels into a wideband environment. The increased frequency congestion which will result requires the use of antennas capable of providing the sufficient discrimination necessary to effectively accommodate the additional systems. New standards should not be overly stringent, but should better reflect the technology available in todays market place. Updating the antenna standards would be an important step toward ensuring spectrum efficiency and would facilitate the introduction of narrowband channels into the common carrier bands.

The current regulations require the use of antennas meeting performance Category A, except that in areas not subject to frequency congestion, antennas meeting standards for Category B may be employed. As we mentioned in our comments to the FNPRM, without defined areas of frequency congestion (Private Microwave bands have defined areas of frequency congestion), it is feasible that paths could be coordinated in the most congested area with only Category B antennas. This will only further exacerbate the congestion problem as future licensees will have to coordinate around the Category B antenna. While the rules state "that the Commission may require the use of a high performance antenna where interference

problems can be resolved by the use of such antennas", it has been our experience that once a licensee has installed his system, it is extremely difficult and time consuming to "force" him to upgrade his antenna. We believe that it would be a better policy to have defined areas where Category A antennas must be used.

We recognize API's concerns with the increased tower and antenna costs to meet the current antenna standards in the lower 6 GHz band. This is certainly a concern for displaced 2 GHz users currently using grid antennas and monopoles for towers. However, in shared frequency bands the requirements must be identical for all classes of users. In addition, relaxing the current standards would exacerbate the frequency congestion problem. With over 52,000 licensed frequencies, the lower 6 GHz band is already very congested in most areas of the country. Frequency congestion will only increase with the addition of the displaced 2 GHz users and additional paths to be added in the future.

The vast majority of high capacity licensees in the common carrier bands use Ultra-high performance or Horn antennas throughout their systems. These antennas far exceed the requirements of Category A, so many more paths can be coordinated on the same frequency as a result. Consequently, new proposals could conceivably be coordinated with lesser performance characteristics due to the superior performance of the existing antennas.

A comparison of an Andrew Corp. Ultra-High performance UHX6-59H (6 GHz) antenna to Category A reveals the following:

	<u>5-10°</u>	<u>10-15°</u>	<u>15-20°</u>	<u>20-30°</u>	<u>30-100°</u>	<u>100-140°</u>	<u>140-180°</u>
Cat. A	25	29	33	36	42	55	55
UHX6	25	30	40	43	50	75	75

Most of the antennas in use today are eight foot in diameter and larger, so significant improvement in the near-in sidelobes above those depicted above can be expected. A detailed study of the lower 6 GHz and 11 GHz bands would reveal that several areas are subject to "Super Congestion" where we believe a higher performance Category antenna should be required. NSMA Working Group 16 is currently studying the antenna performance requirements, however, this is a time consuming process and will not be completed before June 1993. In the meantime, we suggest the following requirements pending the outcome of NSMA's (or another group's) analysis:

5925-6425 MHz (Lower 6 GHz)

1. Narrow band channels less than 5 MHz bandwidth assigned only in the guard bands should be subject to current requirements. Since there is relatively little use of these guard bands, many new paths could be implemented with Category B antennas. This is important as antenna cost will have to be minimized to make these bandwidths economically feasible.

2. All 5, 10 & 30 MHz bandwidth channels should use at least current minimum Category A antennas until congested areas are defined. Category B antennas could be authorized with inclusion of a suitable showing demonstrating the lack of congestion.

10700 - 11700 MHz

1. Minimum antenna beamwidth should be specified as 1.6° in order to be consistent with the minimum gain requirement.
2. Requirements specified in the FNPRM should be maintained pending further industry study.

ATPC

Comsearch concurs with the comments made by several parties to formally recognize and to allow for the maximum benefit of ATPC operation in both the private and common carrier bands.⁹ While we agree with the statements made in the joint comments of Harris Corporation, Digital Microwave and Telesciences regarding the many benefits of ATPC, we feel the rule changes proposed by the NSMA better reflect the use and methods of deployment of ATPC systems. Concerns raised by GTE Service Corporation regarding potential

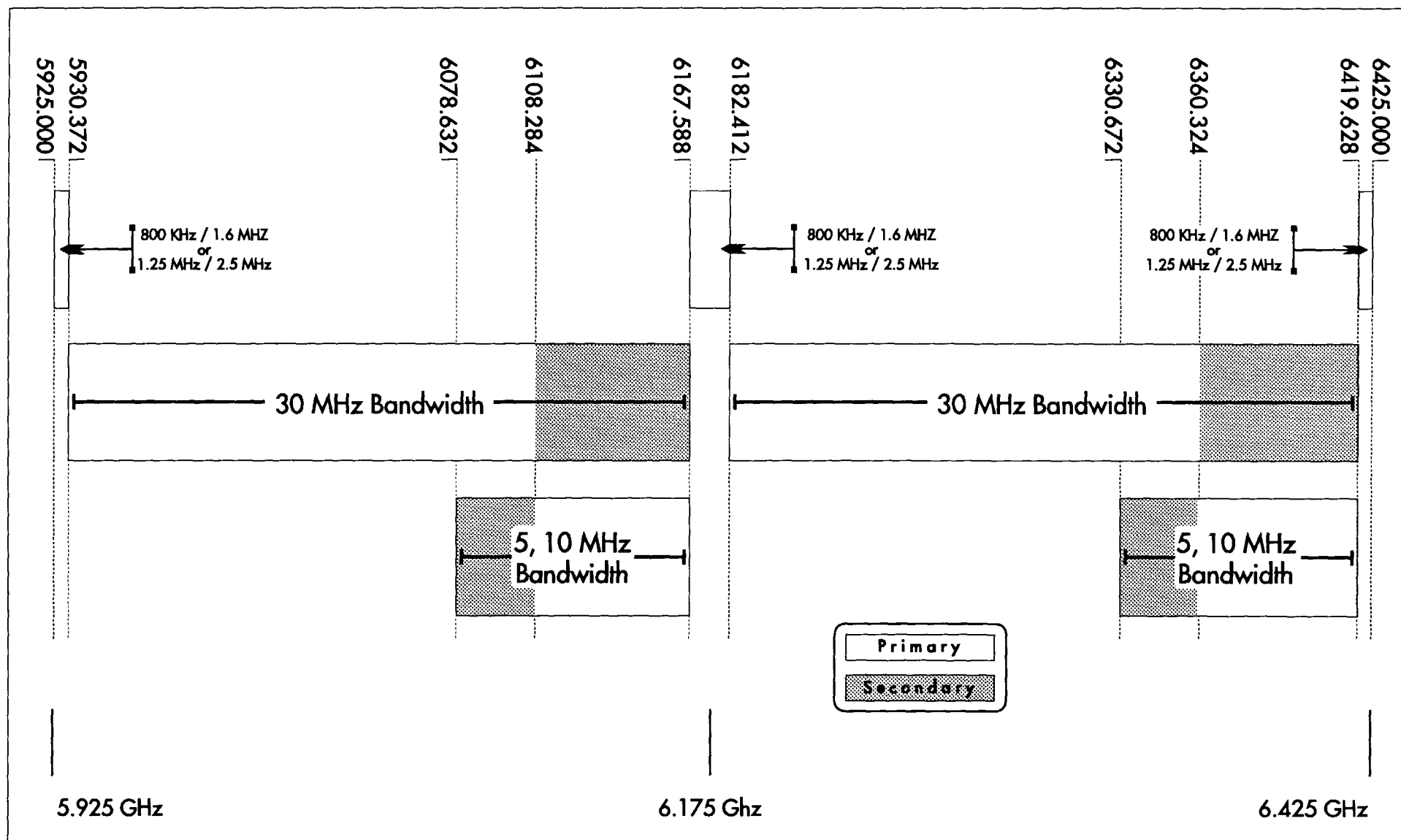
⁹ See, comments of AT&T, NSMA, USTA, and joint comments of Harris Corporation, Digital Microwave and Telesciences.

interference into satellite earth stations are well founded.¹⁰ Guidelines for ATPC use established by the NSMA address many of GTE's concerns and we feel that administration of interference standards (ie time percentages, justification of the interference advantage) should be relegated to the coordination community.

¹⁰ See, comments of GTE Service Corporation, page 9 and 10

Summary of Proposed Bandwidth Allocations 5.925 - 6.425 GHz

Figure 1



WHEREFORE, THE PREMISES CONSIDERED, Comsearch respectfully requests the Commission to take action consistent with the views expressed herein.

Respectfully Submitted,

COMSEARCH

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CERTIFICATE OF SERVICE

I, Meredith S. Workman, a secretary at Comsearch, do hereby certify that the attached Reply Comments were mailed on January 22, 1993, by first class mail, postage prepaid, to the following:

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